tech briefs

Westinghouse Savannah River Company

Valve boosts efficiency of remediation technique

BaroBall™ Control Valve

at a glance

- Low-cost alternative treatment technique
- Simple design
- Easy to install
- Easy to maintain
- U.S. Patents 5,641,245 and 6,425,298
- Canadian Patent 2,221,770

for more information

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Barometric pumping is a remediation technique that removes volatile contaminants from soil in the vadose zone, above the water table. At Westinghouse Savannah River Company (WSRC), scientists have developed a control valve that increases the efficiency of barometric pumping. The BaroBall™ control valve allows natural soil gas to flow out of an underground well, while restricting airflow from the surface into the well. Air flowing into the well from the surface will dilute and possibly spread contaminants still present in the subsurface.

Background

Wells screened in the unsaturated zone have been observed to inhale ambient air and exhale soil gas. These natural air flows in wells are determined by barometric pressure fluctuations, permeability of the subsurface, and depth of the well screen. The difference between surface and subsurface pressures is the driving force for these flows.

A ping-pong ball

The BaroBall control valve uses a ping-pong ball to provide low cracking pressure for outflow and to seal the well during inflow. When atmospheric pressure is higher than the pressure in the well (flow into the well), the ball is forced down and seals against the valve seat, thus closing the valve. When the pressure in the well is greater than the surface pressure, the ball rises on the stream of air and allows outflow.

The pressure required to open the valve (cracking pressure) is related to the weight of the ball and is approximately 1 mbar. The valve is a simple, inexpensive mechanical device requiring minimal maintenance.

In-line condenser prevents condensation

An in-line condenser between the well and the valve prevents moisture condensation in the valve that could cause the valve to freeze in one position during cold weather. The condenser holds the condensed water that is produced when warmer, moist air from the subsurface is cooled in the valve tubing during cold weather. The condensate can be drained periodically with a valve in the bottom of the condenser.

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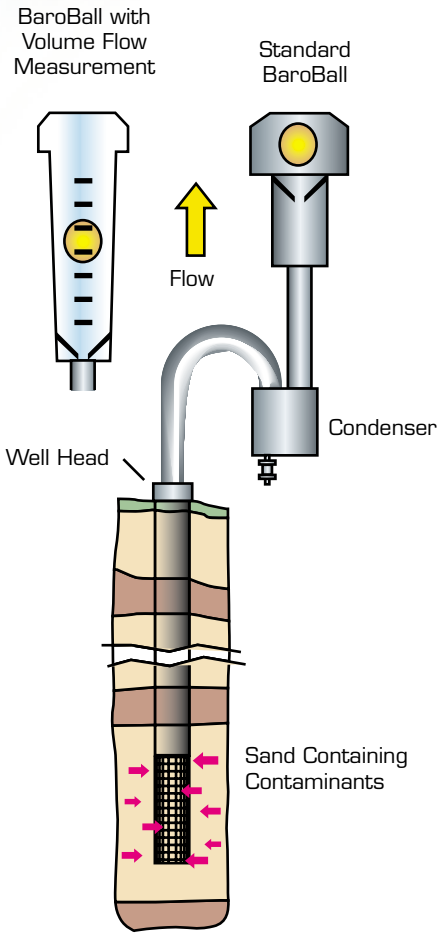
BaroBall™ control valve with volume flow measurement



Volume flow measurement

A new feature has been added to the BaroBall valve to incorporate the ability to measure the volume of air passing through the valve without hindering its operation. The new design consists of a tapered column that permits the ping-pong ball to rise in the column in proportion to the flow rate. By periodically recording these flows along with vapor concentrations, the overall performance of the passive remediation system can be evaluated.

Valve boosts remediation technique efficiency

When accelerated remediation techniques are used in conjunction with barometric pumping, the use of the BaroBall valve with the flow measurement feature can provide evidence of increased flow, indicating the effectiveness of these techniques.

Partnering opportunity

The U.S. Patent and Trademark Office has issued Patent No. 5,641,245 and Patent No. 6,425,298 on the BaroBall valve. Patent No. 2,221,770 has been issued by the Canadian Intellectual Property Office.

WSRC invites interested companies with proven capabilities in this area of expertise to enter into a licensing agreement with WSRC to manufacture and market this device as a commercial product. Interested companies will be requested to submit a business plan setting forth company qualifications, strategies, activities and milestones for commercializing this invention. Qualifications should include past experience at bringing similar products to market, reasonable schedule for product launch, sufficient manufacturing capacity, established distribution networks, and evidence of sufficient financial resources for product development and launch.

Technology transfer

WSRC is the managing contractor of the Savannah River Site for the U.S. Department of Energy. WSRC scientists and engineers develop technologies designed to improve environmental quality, support international nonproliferation, dispose of legacy wastes, and provide clean energy sources.

WSRC is responsible for transferring technologies to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness.

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technology transfer

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